

Michael JUPE et al

R.36764

IN THE ABSTRACT

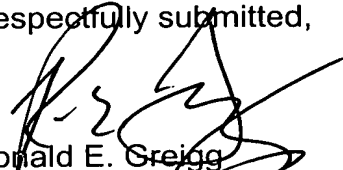
Please substitute the attached amended Abstract of the Disclosure for the abstract as originally filed.

REMARKS

The above amendments are being made to place the application in better condition for examination.

Entry of the amendment is respectfully solicited.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE**IN THE SPECIFICATION**

Page 1, between the title and paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 U.S.C. 371 application of PCT/DE 00/02535 filed on August 1, 2000.

[0000.6] BACKGROUND OF THE INVENTION

paragraph [0001] has been amended as follows:

[0001] Prior Art Field of the Invention

paragraph [0002] has been amended as follows:

[0002] The invention relates to an improved apparatus for furnishing a working pressure in a fluid, having a first region in which a first pressure prevails that is higher than the working pressure, a second region in which the working pressure is to be furnished, and means for reducing the first pressure in the first region to the working pressure in the second region, which means are disposed between the first region and the second region. The invention also relates to a method for furnishing a working pressure in a fluid, in which fluid from a first region at high pressure is transferred to a second region at lower pressure, and the pressure of the fluid is reduced to a working pressure in the second region.

between paragraphs [0002] and [0003], the following insertion:

[0002.5] Description of the Prior Art

paragraph [0003] has been amended as follows:

[0003] An apparatus and a method of ~~this~~ the generic type described above are used for instance in reservoir-type injection systems for Diesel engines. In reservoir injection or common rail injection, the pressure generation and injection are decoupled from one another. The injection pressure, for instance of 200 to 1800 bar, is generated independently of the engine speed and of the injection quantity and is available for the injection in the rail or fuel reservoir.

Page 2, paragraph [0005] has been amended as follows :

[0005] Fig. 1 schematically shows a design for furnishing ~~an~~ a working pressure in an injector. This design can be used both to explain the invention per se and, at this point in the description, to explain the prior art. In a first region 10, the pressure of the common rail prevails, while in a second region 12, the working pressure for the injector is to be made available. The first region 10 and the second region 12 communicate with one another via a piston 14. The pressure buildup in the second region 12 and thus in the injector takes place via the gap flow of the piston 14. To adjust the working pressure in the second region 12 to the correct value, in the prior art a pressure-holding valve 16 is provided, which adjusts the pressure. As soon as the working pressure and the second region 12 exceeds a rated pressure, the pressure-holding valve 16 opens and finally blows the requisite quantity of fluid as a leakage quantity into the fuel tank, until the working pressure in the second region 12 is reached again. The pressure-holding valve 16 then closes.

paragraph [0006] has been amended as follows:

[0006] In the prior art, regulating the working pressure is accordingly done at the cost of a relatively large leakage quantity. The ~~affect~~ effect of the undesired large leakage quantity is further reinforced by the fact that the pressure in the common rail is not constant over the various operating states. On the contrary, the pressure can vary within a range from 200 to 1800 bar. Consequently at high pressure, a substantially larger fluid quantity will flow out of the first region 10 into the second region 12 via the inflow piston 14 than at the low common rail pressure. For this reason, precisely at a high common rail pressure, a considerable pressure compensation via the pressure-holding valve 16 is required, which entails a large leakage quantity.

Page 3, paragraph [0009] has been amended as follows:

[0009] ~~Advantages of the Invention~~ SUMMARY OF THE INVENTION

Page 4, paragraph [0011] has been amended as follows:

[0011] Preferably, the means for reduction include a bore having a structure varying in the longitudinal direction, and a piston, which is displaceable in the longitudinal direction in the bore as a function of the pressure difference existing between the first region and the second region, so that the resistance to the fluid varies depending on the piston position. In the above-described prior art, a solid fixed dimension inflow piston was used. Consequently, regardless of the pressure in the first region and the second region, the same inflow gap always existed, which led to an undesired increase in pressure in the second region at a high common rail pressure. This could be reduced

only by diverting the fluid into a leakage line. The invention now advantageously utilizes the change in pressure in the first region, even though that is initially problematic with a view to the most constant possible working pressure in the injector. However, by providing that the pressure difference displaces the piston in precisely such a way that the overflow of the fluid is regulated, the furnishing of a virtually constant working pressure in the injector, regardless of the current common rail pressure, is achieved.

Page 5, paragraph [0013] has been amended as follows:

[0013] Advantageously, the piston is guided over its entire displacement path by the bore. For instance, if the bore is designed such that it has a first portion and a second portion that in cooperation with the piston present various resistances to the fluid, then these portions are advantageously both nevertheless designed in such a way that they guide the piston over its entire displacement path. This makes for reliable, ~~malfunction-free~~ trouble-free pressure regulation.

Page 6, paragraph [0017] has been amended as follows:

[0017] Preferably, the pressure in the first region is between about 200 and 1800 bar. With the invention, it is possible to ~~adjust~~ establish a virtually constant working pressure in the second region, even though a pressure change of virtually one order of magnitude occurs in the first region.

Page 9, paragraph [0027] has been amended as follows:

[0027] ~~Drawing~~ BRIEF DESCRIPTION OF THE DRAWINGS

paragraph [0028] has been amended as follows:

[0028] The invention will now be explained taking preferred embodiments as an example in conjunction with the accompanying drawing: in which

paragraph [0032] has been amended as follows:

[0032] Fig. 3 schematically shows an apparatus according to the prior art.

paragraph [0033] has been amended as follows:

[0033] ~~Description of the Exemplary Embodiment~~ DESCRIPTION OF THE
PREFERRED EMBODIMENT

Page 10, paragraph [0035] has been amended as follows:

[0035] In Figs. 2a and 2b, pistons 14 for transferring fluid from the first region 10 to the second region 12 are shown in two different operating states. In Fig. 2a, an operating state can be seen in which a comparatively low pressure prevails in the first region 10. In modern common rail systems, the pressure in the first region 10 during the operating state shown can be about 200 bar. The piston 14, which is disposed in a bore 18, is urged by force in the direction of the first region 10 by a spring 20. The bore 18 is divided into two portions. The first portion 22 in cooperation with the piston 14 presents considerably lesser resistance to the fluid than the second portion 24. Or in simpler terms, the second portion 24 is more sealing, while the second portion 22 is ~~not~~ less sealing. However, both portions 22, 24 serve to guide the piston 14.

paragraph [0036] has been amended as follows:

[0036] If the pressure in the ~~second~~ first region 10 now increases, then sometimes the state shown in Fig. 2b ensues. The piston 14 is driven upward counter to the force of

the spring 20, departing entirely or in part from the portion 22 and penetrating the sealing portion 24 entirely or in part. Consequently, a considerably greater resistance is now presented to the fluid. As a result, despite the substantially elevated pressure in the first region 10, in the ideal case the same working pressure is established in the second region 12 as was already present in the situation shown in Fig. 2a.

paragraph [0037] has been amended as follows:

[0037] The above description of ~~the~~ an exemplary ~~embodiments~~ embodiment of the present invention is intended solely for purposes of illustration and not for the sake of limiting the invention. Within the scope of the invention, various changes and modifications may be made without departing from the scope of the invention or its equivalents.

after paragraph [0037], inserted new paragraph:

[0038] The foregoing relates to preferred exemplary embodiments of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.

Page 14, the abstract has been amended as follows:

Abstract **ABSTRACT OF THE DISCLOSURE**

An apparatus for furnishing a working pressure in a fluid is disclosed, having a first region in which a first pressure prevails that is higher than the working pressure, a second region in which the working pressure is to be furnished, and means for reducing the first pressure in the first region to the working pressure in the second region, which means are disposed between the first region and the second region; the means for reduction can be influenced by the pressure difference between the first region and the second region, so that at a large pressure difference between the first region and the second region, a greater reduction is effected than at a low pressure difference between the first region and the second region. A method to be performed on an apparatus according to the invention is also disclosed.

(Fig. 1)